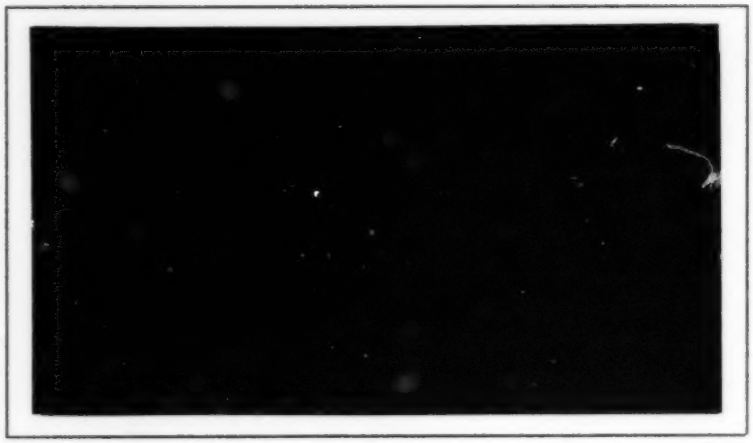

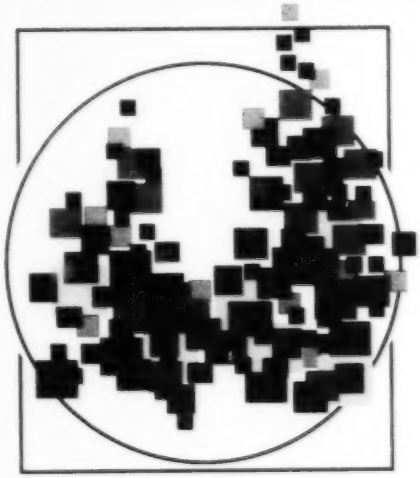

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Analysis of Female Underrepresentation In Computing Sciences Departments -- What Can Be Done

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ANALYSIS OF FEMALE UNDERREPRESENTATION IN COMPUTING SCIENCES DEPARTMENTS-- WHAT CAN BE DONE?

by V. Dahl

Only 27% of the SFU first year students in Computing Sciences are women. For 1990 graduates, the figure is less than 18% , and for faculty members, less than 7%. This report examines why women are far from constituting roughly the 50% in our school (and in CS departments across the country) that they constitute in the outside world and in many other disciplines.

Causes of underrepresentation in Computing Sciences

Both facts and myths contribute to the underrepresentation. *Among the facts:*

- the ***scarcity of role models*** with whom prospective women scientists can identify. The Engineering and Applied Sciences fields have a smaller proportion of women in full-time teaching positions than any other field. The rank where women have the largest representation in Sciences and Engineering is that of lecturer, at 15%; less than 1% of full professors are women[23].

- ***female-demeaning events*** organized by unrepresentative but influential male university groups (e.g. the recently banned[1] UBC Lady Godiva parade), ***and emotional or physical violence*** (e.g. the sporadic harassment epidemics against female dorm UBC students, the University of Montreal massacre, the Queen's University "Say yes" signs on male dorm windows in response to the *Stop date rapes* campaign, etc.). These events actively drive many women away from environments that appear hostile to them. Even if the hostility is not wide-spread, the fact that these extreme attitudes potentially exist in university environments is sufficiently threatening for many women who view them as symptomatic of other, perhaps less spectacular but more widespread anti-women attitudes. In addition, many women also bring in the ghost of violence from their own homes (18% of women visiting hospital emergency wards are victims of domestic violence [11]). Those university environments that are predominantly male, such as ours, intimidate these women more than those in which they feel accompanied and supported by a larger number of women.

- ***explicit discouragement by influential figures***, including parents and school counsellors who often counsel girls and young women against science[2].

- ***poverty*** , more often suffered by women than men [17], seems to deter from careers reputed as time-consuming for fear that they will take longer, particularly if taken in conjunction with family responsibilities, and therefore result in large debts. The number of women living in poverty grew by 110% in the past decade, and women still earn 66 cents to every dollar earned by men [11].

- even in academia, ***women are typically hired at lower ranks, paid less and promoted later than their male cohorts*** . At SFU for instance, the average salary difference is about $4,000. Female professors can expect to earn, after 25 years of service, $10,000 less than their male cohorts with equal background, and the difference increases every year [2].

*Among the **myths**:*

- the widely spread myth that ***women are not good in science***. Both women and men absorb this myth from a tender age, through stereotyped upbringings and through the media which often excludes women from unconventional activities or from existence in some cases (e.g. most TV children's programs, and some adult ones such as Star Trek, misrepresent females as numerically less than males, there are presently no Saturday morning cartoons with a female "hero", etc.).

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[1] It is interesting that the cause for this ban was economic rather than conscientious: the university's pressure through suspending collecting fees for the Engineering Undergraduate Society resulted in a $20,000 debt which left the EUS little choice but to agree to the deal, according to its vice-president Gary Chan [8].

[2] Personal communication, Hilda Ching, Helmut Jurgensen, and Academic Women at SFU.

- the widespread belief, both among men and women, that on top of their special contribution as birthgivers and breastfeeders, ***women are primarily responsible for the continual labour as house keepers and child raisers, even while assuming the same job/study responsibilities as their spouses or partners.***

- ***science careers' reputation for being "male" and for consuming all of a student's time,*** including the time that is needed for family, outside interests or any extra-academic activity. Those students, often female, who are trapped into providing primary or full family care, cannot afford the over-dedication that they believe is expected in science carreers-- and that is, unfortunately, often expected. The "mad scientist" popular image, which is male, makes this problem worse.

The combined message that women will have less ability and time for scientific pursuit, together with their vulnerability due to widespread lack of economic and political power, explain much of the timidity and lack of confidence the literature reports as typical of female students.

Can we do anything about it?

At first introduction, this may seem an overwhelming societal problem for us to do anything about. Yet because we are a part of the society that causes it, doing what we can is far better than doing nothing.We can help in two general ways:

I - Through thoughtful de-activation of the unconscious mechanisms of discrimination:

Both men and women have absorbed the myths and status-quo, and for both sexes it is easy to unconsciously operate on the assumption that the myths are true and that the facts are irreversible. The problem is not one of men versus women, but one of detecting which stereotypical male-centered or male-dominance thinking we have absorbed and are enacting, whether we be male or female. Among the practical suggestions I have gathered regarding the practice of conscious non-discrimination are the following:

- try to ***detect and avoid any patronizing behaviour*** and assumptions that women are less qualified and/or committed than men. The cumulative effect of subtle discrimination may be even more harmful than relatively infrequent incidents of overt discrimination.

- increase awareness of, and sensitivity to, the use of a variety of communication styles, especially ***less aggressive styles*** which women often feel more comfortable with, and conversely, allow women to comfortably play more assertive roles as well.

- in ***professional*** situations, try to ***focus on a woman's professional identity*** rather than placing emphasis on her gender: avoid personal remarks, comments about appearance,etc. Be conscious of impolite attitudes around you, such as men who focus on a woman's chest rather than her eyes during a conversation (such attitudes sound hilariously improbable, yet are reportedly more common than one would imagine).

- try to ***discourage sexism*** when you encounter it at the university, whether it affects students, colleagues or staff.

- try to ***discourage sexism also in social meetings outside the university***, particularly in social gatherings of people from male-dominated disciplines (e.g. through female support groups, through discouraging others from insensitive comments or jokes, etc.).

- try to ***avoid the invisibility syndrome*** reported e.g. in [4]: address women students as often as men students, make just as much eye contact with both, watch for the increased frequency with which women are interrupted, use language and examples that aren't gender-biased, etc.

II- Through affirmative action

It is clear that reversing both the myths and the facts that contribute to women's underrepresentation in the sciences will take much more than stopping conscious or unconscious discrimination, even if we are successful in stopping discrimination completely. While some people may feel uncomfortable with actively promoting women-hospitable environments, and believe it to be reverse discrimination, others recognize that merely providing *equal* treatment in a situation that is unequal will not achieve fairness, and that some "unequal" measures must be taken to help overcome the present inequity. For instance, instituting scholarships that are only for women does not hinder male students, since men are overrepresented in relation to women, and have, as a group, more economic power. Naturally, affirmative action does not include lowering the academic standards in any way, but simply removes many of the possible barriers that women face[3]. It also does not preclude affirmative action towards other disadvantaged groups. Women are my focus only because they constitute half the population and suffer a double disadvantage when they also belong to other underrepresented groups. Here are some of the suggestions I have gathered for positive action:

- ***HIRE MORE WOMEN AT ALL RANKS***. This is perhaps the most effective way in which we can help, since the scarcity of role models is perceived as one of the most important factors in women's underrepresentation. This is a realistic goal even right now, since in ours as in all disciplines, the percentage of women with PhDs (the pool of possible professors) is significantly higher than the percentage of women professors [15]. It involves actively searching for qualified females for each available position, encouraging them to apply, advertising what it is we are doing to make our environment more hospitable to women, watching out for possible gender-biased misperceptions by recruiters, systematically preferring a female to a male candidate under equal qualifications until a 50/50 representation is achieved, etc.

- ***make the existing female role models more visible***. E.g., incorporate time for these women to give talks in high schools; prepare brochures that have photographs of women as well as of men faculty and students, use s/he in all brochures; include profiles of highly successful women who have degrees from SFU and work outside the university (BC Hydro has several of them, some women grads have started their own companies, etc.)

- complement NSERC's financial efforts (NSERC plans to spend about $1 million a year to encourage women to enrol in science courses) by ***actively recruiting women***. For instance, implement programs such as *Women can do Computing Science* (along the lines of the existing *Women can do math*); continue and perfect *Target* ; advertise in the Peak, highlight courses that may particularly benefit women, if any, and make explicit that women are welcome; send brochures to conferences and events usually attended by potential students; prepare a brochure to distribute in high schools (in particular, to Home Economics teachers, most of whom are female, have female students, and work with computers); ask school counsellors and parents to try to avoid stereotypical counselling against science; encourage buddy systems for women; etc.

- ***humanize our dedication expectations***: there should be no stigma or penalty attached to either putting in no more than normal working hours or to studying on a part-time basis. Currently, students who cannot commit to the performance expected from a full-time student are often explicitly discouraged. More flexible solutions could be made available, particularly for grads.

- ***petition the pertinent institutional representatives to remove the barriers placed on students who cannot achieve a "normal" course load*** : e.g., let part-time students, particularly if principal care-givers of small children, qualify for loans, scholarships, grad programs, etc., just as their care-free full time peers would; let both members in a couple qualify for student loans, provide easier access to daycare, allow for parental leave for grads, etc.

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[3]Affirmative action is a delicate and complex issue which deserves careful study. For instance, if employers are not clearly aware that scholarships to women simply remove barriers and do not involve a lower academic standard, they may view them as "second class" scholarships.

- ***give praise and encouragement***: since female students often exhibit diminished self esteem from exposure to negative comments and messages, it is important not to withhold praise when it's due, and to make a point of encouraging these students in order to deconstruct the ingrained and fallacious belief that they cannot succeed.

- petition the pertinent authorities to ***institutionalize salary equity*** as Ontario and Quebec have. In the meantime, request implementation of the recommendations produced by the Salary Equity Study Committee to ***correct the existing salary anomalies***.

Conclusion

The above analysis and suggestions are only a starting point for alleviating a very difficult problem. I would like to suggest a) the creation of a committee which could help study the problem more thoroughly and implement measures to address it at the departmental/school levels, and b) the creation of the position of Associate Dean for the Promotion of Women, along the lines of UBC's. As well, in the interim, I would like to appeal to faculty to consider adopting those suggestions that are within their reach.

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